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ABSTRACT

Vocational education researchers have relied heavily on opinionnaires to measure opinions and attitudes. Usually respondents are asked to indicate their degree of agreement to an attitude or opinion statement. Where significant statistical differences exist for opinions/attitudes there is still always the problem of confidence with which respondents respond to statements. This level of confidence is rarely determined in most studies. In this paper the use of the Certainty of Response Rating Technique (CRRT) in vocational education research is suggested as a measure of level of confidence. Its practical application is illustrated using a 1982 study of agricultural teachers concerning their opinions of international agricultural and rural development. The CRRT appears to have four major functions: (1) as a moderator variable, changing the kind and nature of relationship between two other variables; (2) to partition respondents into more homogeneous groups; (3) for interpreting research findings with a higher degree of confidence; and (4) to improve the initial correlations between predictor and criterion variables. (Author/BW)

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Improving Attitude Measurement in Vocational Education Research: The Certainty of Response Rating Technique

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Abstract

Vocational education researchers have relied heavily on opinionnaires to measure opinions and attitudes. Usually respondents are asked to indicate their degree of agreement to an attitude or opinion statement. Where significant statistical differences exist for opinions/attitudes there is still always the problem of confidence with which respondents respond to statements. This level of confidence is rarely determined in most studies. In this paper the use of the Certainty of Response Rating Technique (CRRT) in vocational education research is suggested as a measure of level of confidence. Its practical application is illustrated using a 1982 study.

Improving Attitude Measurement in Vocational Education Research: The Certainty of Response Rating Technique

Research in vocational education has emphasized the measurement of opinions, perceptions and attitudes. These attitudinal measures are usually made on populations that vary greatly and on issues that differ significantly too. In vocational education the researcher appears to rely heavily on survey designs with the measurement of attitude often comprising a significant part of the research (Kahler, 1973; Mannabach, 1980; McCracken, 1970.)

There appears to be a general consensus among experts in attitude research that measuring attitude is a difficult scientific activity. One very important reason for this difficulty might be attributed to the contention by Elizur (1970, p. 36) that "There exists no commonly accepted definition of the (attitude) concept." And according to Fishbein and Ajzen (1972, p. 488) "many of the apparent inconsistencies and controversies in the area are largely pseudoproblems created by this conceptual ambiguity." Conceptualists and theorists, nonetheless, have continued to search for a common definition.

In the meantime, researchers remain committed to efforts towards improved methods and techniques for measuring attitudes. Some investigators in the social sciences, particularly psychology, have employed additional techniques to obtain more valid and reliable measures of opinions or perceptions. One technique which shows promise in vocational education research is the Certainty of Response Rating Scale (CRRS).

Purpose and Objectives

The primary purpose of this paper is to share the idea that soliciting respondents' level of confidence ratings on attitudinal measures of interest is a necessary additional step in attitude measurement. In this regard the authors are introducing the Certainty of Response Rating Scale (CRRS) as a complementary technique to the Likert-type scales often used to measure attitudes. Two specific objectives formulated to help achieve the above purpose were:

1. To describe the theoretical-conceptual bases of the CRRS; and
2. To illustrate the major functions of the CRRS using previous studies.

The Theoretical-Conceptual Base for the Certainty of Response Rating Scale

The measurement of attitudes is often an important component in social educational research. Eagly and Himmelfarb (1978) underscored this point when they concluded that neither the attitude concept nor attitude research is dead as pronounced. Rather, they observed that "proper emphasis and attention are paid to them in much larger system of social psychological phenomena and concepts" (p. 543). This is especially true in vocational education. Researchers in the profession will probably find themselves undertaking studies in attitudinal measures at an increasing rate with increasing complexity.

McCracken (1970) in addressing the methodological weaknesses of survey research pointed out that major problems result from questionable reliability and validity of measurement instruments among many others. There is also the problem with the analytical procedures associated with attitudinal data (Fishbein and Ajzen, 1972). As a result even when the

measuring instrument has been determined to be highly valid and reliable the overall quality of the research is still questionable because of the high probability associated with drawing unwarranted or invalid conclusions due to the superficial or aberrant nature of the responses. Cook and Campbell (1979) identified the unreliability of measurement as one of the threats to statistical conclusion validity. Subsequently, they suggested the use of more aggregated units (group means instead of individual responses) to improve the reliability of results. This is an argument in support of ascertaining more homogeneous groups before data are analyzed.

Parenthetically when data from attitudinal scales are analyzed using, say, mean ratings (judgements or responses) on some psychosocial or psychophysical object there appears to be similarities across subgroups of the sample or even population of interest. In such studies the researcher usually concludes "no significant differences." However, empirical evidence exist to the contrary that similarity in appearance of attitude is, under greater scrutiny, yet underlain by significant differences with respect to confidence judgements. (Johnson 1940, 1941 and 1945; Pollack and Decker, 1958; Ghiselli, 1956, 1960, 1963; Converse, 1970; Sample and Warland, 1973; bin Yahya, Richardson and Moore, 1983.)

The need to search for better ways of determining the existence or non-existence of true significant differences when measuring attitude-related concepts appears to be self-evident. One approach to improving attitude measurement has been the certainty ratings of decisions (agreement, favorableness, willingness to act, etc.). Johnson (1945) argued that certainty is an important dimension of the judgement

process. He noted that judgements may appear to be similar but may be made with varying degrees of confidence. Furthermore, he remarked that indication of confidence could range from a pure guess (or zero confidence) to absolute certainty (or 100% confidence). And as Converse (1970) pointed out somne people for some reason will oblige to try a response of opinion even when none really exists. Such individuals, he discovered usually respond in a manner indicative of a positive or negative position, a manner not different from that of individuals with well developed or strong attitudes. In order to secure more reliable data for analysis he suggested they be excluded.

In Saunders' (1956) study, a variable was used to help in the identification of such individuals. He called this variable a moderator variable while Ghiselli (1963) referred to it as a predictability variable.

According to Guion (1965) a moderator variable serves to predict individual error of measurement (judgement) by changing the kind and nature of relationship between two other variables. Users of the moderator variable tend to increase the probability of selecting data from high-certainty respondents for further statistical analyses if so desired. In both conceptual and nomological contexts, this technique has great utility for Upshaw (1962) remarked that an adequate theory of judgement (an attitude) should surely encompass all facets of the judge's reference scale. Thus, for example, not only are the opinions of respondents important but also the degree to which the respondents are confident of the expressed opinions is equally important for drawing valid statistical conclusions. Furthermore, Hollingworth (1925)

contended that a judgement (opinion) could be defined in terms of confidence of the result.

Studies (Festinger, 1943; Johnson, 1939; Pollack and Decker, 1958) have revealed that scales of confidence of judgement are often distributed in J- or V-shape since such scales are usually anchored at both extremes. The relationship between confidence of response and the psychophysical or psychosocial variable usually appears to be ogive but of a more gradual slope though.

Certainty rating of decisions seems to take different forms according to what is measured. Conceptually, the phenomenon is defined in the context of certainty or confidence of response, hence, the Certainty of Response Rating (CRR).

The CRRS or its modified form has been used by Pollack and Decker (1958), Torrance and Aliotti (1965), Bertram and Pargament (1967), Rambo (1969), Converse (1970), Sample and Warland (1973), and bin Yahya, Richardson and Moore (1983). Only three of these studies will be presented to illustrate use of the CRRS.

Examples of the Certainty of Response Rating Scale in Use

The Pollack and Decker (1958), Sample and Warland (1973) and bin Yahya, Richardson, and Moore (1983) studies are presented to illustrate some of the primary functions of the CRRS. The first two studies will be presented rather briefly and then the third in greater detail.

A brief statement of how the CRRS is employed in data collection is in order. Two steps are usually followed:

1. First, the respondent is instructed to respond to a statement or item related to some psychosocial or psychophysical object

of interest using a Likert-type continuum. For example: an agree-disagree scale (binary or otherwise).

2. Then, for each response he/she is requested to indicate the level of confidence with which the judgement (or response) was made.

Figure 1 shows one page of the instrument used in the bin Yahya, Richardson, and Moore study. For each statement on the instrument the respondents were asked to indicate 1) their degree of agreement and 2) how certain they are of their degree of agreement. This is typical of the use of CRRS.

The Pollack and Decker Study

This research comes from physics. The goal of this research in acoustics was to improve accuracy in the message reception of listeners (receiving operators) within the Air Force. In addition to their original Standard Articulation Test (SAT) which was a binary (yes-no) decision procedure, a confidence rating scale was introduced. Subjects were presented with 64 test words by an experienced talker operating from a well regulated environment. Subjects were, first, to record test sound as heard, and then also to record judged accuracy of the message received. The confidence judgement scale of 6 points ranged from "Positively, I heard correctly" to "Positively, I heard incorrectly."

Major Findings and Conclusions

1. Confidence rating was found to be directly related to the average accuracy of message reception. 2. There was a relatively invariant relationship between confidence rating and average accuracy of message reception. The researchers concluded that the technique produced a finer grain analysis of the respondents' discrimination

Instructions.

1. Respond to each item of all sections that concern you as completely as possible.

2. (a) On the Likert-type Scale select and circle only one of the five alternatives: "Strongly Disagree" (1), "Disagree" (2), "Undecided" (3), "Agree" (4), or "Strongly Agree" (5).

   (b) On the Certainty Scale circle only one of the five alternatives to indicate the degree to which you are certain of your response (belief, opinion, perception): "Not Very Certain" (1), "Not Certain" (2), "Undecided" (3), "Certain" (4), or "Very Certain" (5).

	Response Scale	Certainty Scale
SECTION A The factors most responsible for the general underdevelopment of Developing Countries		
21. Dysfunctional, largely irrelevant formal educational system.	1 2 3 4 5	1 2 3 4 5
22. Lack of adequate and qualified manpower base.	1 2 3 4 5	1 2 3 4 5
23. Divisive tribalism and ethnic differences.	1 2 3 4 5	1 2 3 4 5
24. Traditional beliefs, values and practices.	1 2 3 4 5	1 2 3 4 5
25. Highly ineffective community leadership.	1 2 3 4 5	1 2 3 4 5
26. Lack of or poor news and communication channels or media.	1 2 3 4 5	1 2 3 4 5
27. An undue imbalance in favor of the primary and agricultural industry against manufacturing and service sectors.	1 2 3 4 5	1 2 3 4 5
28. Very low agricultural productivity per worker of the agricultural population.	1 2 3 4 5	1 2 3 4 5
29. Very low productivity per worker of the economically active population.	1 2 3 4 5	1 2 3 4 5
30. Lack of or poorly developed road, railways and where appropriate waterways.	1 2 3 4 5	1 2 3 4 5
31. Lack of or poor medical facilities.	1 2 3 4 5	1 2 3 4 5
32. Inadequate and/or "inefficient" medical and paramedical personnel.	1 2 3 4 5	1 2 3 4 5
33. The impact of communal land tenure on agricultural development.	1 2 3 4 5	1 2 3 4 5
34. The ever-growing rural to urban migration especially of the economically active population.	1 2 3 4 5	1 2 3 4 5
35. Colonial heritage.	1 2 3 4 5	1 2 3 4 5

Figure 1

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continuum than that provided by their original scale that used only a binary system.

The Sample and Warland Study

These social scientists predicated their investigation on the premise that when respondents with poorly developed or nonexistent attitudes are included in a sample the strength of attitude relations is underestimated. A possible problem associated with studies involving such individuals is that invalid statistical conclusions could result. They contended that identifying these individuals might lead to increased validity and reliability of the attitude measures.

In this study the attitude and activities of students related to student government were measured. Three separate but related Likert-type scales were used to measure student knowledge of candidates for student government elections, and two other behavior measures. Also, respondents were instructed to indicate how certain they were of each response. This scale ranged from "Not Very Certain" coded as 1 to "Very Certain" coded as 5. For the purpose of analysis an average score of 4.0 on the certainty rating scale was considered a cut-off point for high-certainty response.

Major Findings and Conclusions

1. Partitioning the sample on the basis of certainty ratings produced large differences in the relationships between variables. 2. A U-shape relationship was found between certainty rating and the Likert responses. 3. Both high-and low-certainty groups had similar means but differed in standard deviations. The researchers concluded that the use of the certainty technique seems "to involve mainly the identification of individuals who indicate positive attitude positions

but fail to show activities consonant with their attitude expression." (p. 301)

The bin Yahya, Richardson, and Moore Study

In 1982 the researchers conducted a study of agricultural teacher educators concerning their opinions of international agricultural and rural development.

The questionnaire had 10 sections with a total of 91 items on two separate scales juxtaposed to each other. The items were concerned with how education and agriculture could be improved in Third World nations. Each scale was on a 5-point continuum. Respondents were to indicate their degree of agreement ranging from "Strongly Disagree" to "Strongly Agree." Then they were to position their judgement on a certainty scale that ranged from "Not Very Certain" to "Very Certain." This was the same scale employed by Sample and Warland (1973). Data for both scales were transformed from the original 5 points to 13 points using the certainty method of assigning values to responses as suggested by Warren et al. (1969). The basic assumption of this technique is that response values have unequal intervals therefore, tails of the original scale are spread out while the middle is pressed together. The teacher educators who participated in the research were placed in three groups and the data were analyzed accordingly. The three groups were:

Group I -- Teacher Educators with International Experience (N=55)

Group II -- Teacher Educators Who Desired International Experience (N=53)

Group III -- Teacher Educators Who Had No Interest in International Activities (N=56)

Even though it is inappropriate to use multiple F-tests (ANOVA on each of the items) in analyzing the data, the researchers did that on 84 items for this paper to illustrate the possible merits of using the CRRS.

Statistically significant differences were found on 12 of the 84 opinion statements. Generally, the differences which existed in attitude or perception were between teacher educators with international experience and those who had no desire for such experience. Since there were no statistically significant differences on 72 of 84 items one might conclude there isn't really a difference in the views of the three groups of teacher educators. However, when we examine how certain each group was of their responses on the attitude statements, a significant number of differences is discovered. When F-tests were calculated on the certainty responses which accompanied each attitude statement, 52 statistically significant differences were found. There was a marked difference in how certain the three groups were of their responses. The conclusions which were reached by examining both the response to the statements and the certainty of that response were different than the conclusion which would be reached by examining response to the attitude statements alone.

Five of the items from the bin Yahya, Richardson, and Moore Study are presented in Table 1 to illustrate how the CRRS aids in interpreting the findings. On the first four items there were no differences on the degree of agreement among the three groups. However, on the certainty scale there were statistically significant difference between teacher educators not desiring international experience and those who were experienced or desired experience.

On the last item there was a statistically significant difference between teacher educators with experience and those who did not desire experience. Those who desired no experience were more in agreement with the statement that people in developing countries were lazy than were the teacher educators who had experience; however, there were less certain of their views. This additional information gathered from the CRRS is valuable in interpreting these findings.

Table 1

Selected Items from the bin Yahya, Richard, and Moore Study

Statement	Degree of Agreement*			Certainty of Response*		
	Educators with Inter. Experience	Educators Desiring Inter. Experience	Educators Not Desiring Inter. Experience	Educators with Inter. Experience	Educators Desiring Inter. Experience	Educators Not Desiring Inter. Experience
People on a poverty level can organize themselves into viable systems.	7.33	6.89	7.30	9.11§	9.00+	7.56
Developing countries need more all-weather roads, railroads, and waterways where feasible.	9.73	9.38	9.18	9.52§	9.94+	7.93§+
Developing countries should adopt the American Land-Grant College concept.	9.25	9.30	9.00	9.63§	9.90+	8.25§+
Agriculture in developing countries needs to be diversified.	8.82	8.42	8.64	9.33	8.68	7.75
People in developing countries are lazy.	4.49+	5.62	5.96+	9.22§+	8.08§	7.46+

*Range of possible score is 1-13 with 13 being the most positive.

Note: Similar symbols (+, §) indicate statistically significant differences in group mean ratings.

Some Thoughts Concerning the Certainty of Response Rating Scale

The CRRS or its modified form has been used in the fields of psychology from where its conceptual and theoretical bases stem, and also in sociology, and physics. In vocational education it appears the only study that has so far employed the CRRS technique is the one by the authors. The CRRS appears to be a promising technique in vocational education research. The CRRS appears to have four major functions. They are:

1. Moderating Function (bin Yahya, Richardson, and Moore. 1983; Day, 1970; Ghiselli, 1963; Guion, 1965; Johnson, 1945; Pollack and Decker, 1958; Sample and Warland, 1973): The CRRS serves as a moderator variable, which changes the kind and nature of relationship between two other variables.
2. Homogeneity Function (Johnson, 1945; Sample and Warland, 1973; Torrance and Aliotti, 1969): As a moderator variable, the CRRS serves to partition respondents into more homogenous groups for judgements may be similar in appearance but vary in the degree of confidence with which they are made.
3. Increased Validity and Reliability Function (Pollack and Decker, 1958; Converse, 1970; Sample and Warland, 1973): Partitioning respondents into high- and low- certainty groups is useful for interpreting research findings. Conclusions are made with a higher degree of confidence.
4. Correlational Function (Bertram and Pargament, 1969; Ghiselli, 1963; Pollack and Decker, 1958; Rambo, 1969; Sample and Warland, 1973; Torrance and Aliotti, 1965): In serving as a set of moderator variables certainty ratings help to improve on

the initial correlations between predictor and criterion variables. This is achieved by partitioning respondents such that validity of the measures is high for one group but low for the other and using the former in the correlational analyses.

While the CRRS appears to have promise for improving attitudinal research in vocational education one should be aware of potential limitations. Four possible limitations have been identified by the authors. These are:

1. Definitional: Semantic differences as to the exact meaning of confidence, certainty, or surety are bound to arise. Conceptual confusion is a problem associated with nearly all other psychological and social phenomena and ideas. (Johnson, 1945; Hollingsworth, 1925)
2. Measurement Constraints: Certainty or confidence judgement is not ontologically different from attitude with respect to measurement. A subject asked to indicate his/her position on a certainty continuum is faced with no less problems as is the case with that subject who attempts to present the socially acceptable self (i.e. public, common, and measured opinions versus private and individual opinions). (Converse, 1970; Hesselbart, 1978; Kiesler and Munson, 1975).
3. Ratio of Response Variance (RRV): RRV refers to differences (about 15% to 20%) between responses to differentially worded statements related to the same attitude object (Waksberg, 1975). The methodological problem here is that it is equally likely that the confidence in response would vary from item to item.

Consequently, a problem of data analysis could come to the fore as well.

4. The Problem of Sets: This issue is related to the measurement and RRV problems noted above. It is two-fold. There is a response set and a judgemental set (Rambo, 1969). The former operates when a subject formulates his/her response on the basis of item content and inter-item relationships. In the latter case he/she responds not on the basis of item-item comparisons but on a comparison of the stimulus item with her/his own position regarding the attitude domain of interest.

These issues are raised here to serve two purposes. First, this is to make the discussion complete -- a critical look at a tool with very great potential. Second, the reader is to be fully aware that several methodological problems could surface even before data analysis.

In summary, we wish to not that despite these possible limitations (albeit common to most, if not all, psychosocial and psychophysical concepts and their measurement), the CRRS has great promise for improving attitude measurement.

Recommendations

Attitude (opinions, perceptions, decisions, etc.) measurement appears to be one of the major areas of endeavor in vocational education research. Irrespective of the type of research design (experimental, quasi-experimental, or survey) collecting valid and reliable data is an essential and critical step in the research process. And one method of securing such data is to oversrep the stage where respondents simply report whether or not they agree to or are in favor of some psychosocial or psychophysical object. Respondents should be allowed to express

their own level of confidence on their judgements (decisions they make). This could be achieved using the CRRS, which appears to reveal the superficialty of similarity of responses when researchers rely exclusively on Likert-type scales.

It is suggested that researchers in vocational education seriously consider the use of the CRRS as a complementary technique as they undertake attitude-related studies. The technique has served other disciplines, so why not vocational education? Let the profession heed the criticism by Matthews and Campbell (1983) that vocational education research appears to be suffering from an ailment of isolation ..... isolation from the works in other academic disciplines. Is it? And should it?

In an attempt to share our experience with the profession, viz-a-viz the utility of the CRRS, it is our hope that some light has been thrown on this rather important but nebulous area of research ..... attitude measurement. We can never be sure as to the number of unanswered questions (presumably the right ones too) we might evoke from among the members of the profession. But we take solace in the belief that knowledge sharing is the hallmark of the wise, of the scholar, and of course, the researcher.

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